

COMPUTERS & EDUCATION

Editors: David F. Rogers
P. R. Smith

Author Index and Volume Contents

VOLUME 12

1988



Pergamon Press

Oxford · New York · Beijing · Frankfurt
São Paulo · Sydney · Tokyo · Toronto

computers and education

An International Journal

published quarterly

EDITORS

Professor DAVID ROGERS
Aerospace Engineering Academy
U.S. Naval Academy
Annapolis
MD 21402, U.S.A.

Dr P. R. SMITH
Department of Nuclear Engineering
Queen Mary College
London E1 4NS
U.K.

EDITORIAL ADVISORY BOARD

A. A. Pouring, U.S.A. (Founder Editor)

J. A. Adams, U.S.A.

D. H. Ahl, U.S.A.

P. B. Ayscough, U.K.

L. Braun, U.S.A.

R. L. Brennan, U.S.A.

C. V. Bunderson, U.S.A.

W. T. Fowler, U.S.A.

S. J. Garland, U.S.A.

P. J. Grant, U.K.

J. R. Hartley, U.K.

A. Hawkins, The Netherlands

J. W. Johnson, U.S.A.

H. A. Kamel, U.S.A.

R. B. Kirchner, U.S.A.

D. R. Kniel, U.S.A.

T. Kurtz, U.S.A.

V. Ledin, U.S.A.

J. Liebowitz, U.S.A.

J. J. Matthews, U.K.

S. D. Milner, U.S.A.

R. L. Phillips, U.S.A.

R. F. Riesenfeld, U.S.A.

W. E. Schiesser, U.S.A.

P. Thorne, Australia

C. H. Warlick, U.S.A.

M. Westrom, Canada

K. L. Zinn, U.S.A.

Publishing Office:

Journals Production Unit, Pergamon Press plc, Hennock Road, Marsh Barton, Exeter EX2 8NE, Devon, U.K.
(Tel. Exeter (0392) 51558; Telex 42749)

Subscription and Advertising Offices:

North America: Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A.

Rest of the World: Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, U.K. (Tel. Oxford (0865) 64881).

Annual Subscription Rates 1989: Annual institutional subscription rate (1989) DM 490.00; 2-year institutional rate (1989/90) DM 931.00; personal subscription rate for those whose library subscribes at the regular rate (1989) DM 120.00. Prices are subject to amendment without notice.

Microform Subscriptions and Back Issues: Back issues of all previously published volumes are available direct from Pergamon Press. Back issues of Pergamon journals in microform can be obtained from: UMI, 300 North Zeeb Road, Ann Arbor, MI 48106, U.S.A.

Published quarterly. Copyright © 1988 Pergamon Press plc

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

Photocopying information for users in the U.S.A.

The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying, beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970, U.S.A.

Permission for other use

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0360-1315/88 \$3.00 + 0.00

CONTENTS

No. 1

COMPUTER ASSISTED LEARNING Selected Proceedings from the CAL '87 Symposium

vii Preface

viii Organising Committee

Keynote Addresses

- | | | |
|---------------------------|----|---|
| Tony Adams | 1 | Computers in learning: a coat of many colours |
| Geoffrey Hubbard | 7 | Recent history and imminent prospects for CAL in the U.K. |
| David D. Thornburg | 11 | From metaphors to microworlds. The challenge of creating educational software |
| Peter Williams | 17 | CAL production: strategies and tactics |

General Papers

- | | | |
|--|----|---|
| Nigel Gardner | 23 | Integrating computers into the university curriculum: the experience of the U.K. Computers in Teaching Initiative |
| A. D. Boardman, G. S. Cooper, B. W. James, G. J. Keeler and J. Swage | 29 | Software development for undergraduates in physics |
| Richard H. Trainor | 37 | Implementing computer-based teaching and research: the need for a collaborative approach |
| C. E. Beevers, B. S. G. Cherry, D. E. R. Clark, M. G. Foster, G. R. McGuire and J. H. Renshaw | 43 | The CALM before the storm! CAL in university mathematics |
| Noel Wilson | 49 | Project PROSE—development and use of an elementary program support environment for CAL production |
| Peter Chandra, Joan Bliss and Margaret Cox | 57 | Introducing computers into a school—management issues |
| Alan Chapman, Keith Young and John Steer | 63 | Raising the standard—system-independent programming for educational software |
| David Squires and Richard Millwood | 67 | The influence of new software environments on CAL development |

Deryn M. Watson	73	A CAL development team in the process of change
Mike Aston	79	Professional development and teacher education—have we got it right?
Martine Chomienne	85	Educational computing implementation: the case of Quebec
Jean Underwood	91	An investigation of teacher intents and classroom outcomes in the use of information-handling packages
M. P. Doyle	101	Cumulative latency-of-response recording for evaluating CAL
John Layman and Wendy Hall	107	Logo: a cause for concern
Giorgio Olimpo	113	The Robot Brothers: an environment for learning parallel programming oriented to computer education
A. J. L. Harrison, J. K. Banwell, M. Frost and W. J. Plumbridge	119	An interactive teaching experiment in materials science
I. W. Burgess and R. J. Plank	125	Project-based teaching software for structural design
G. J. Makinson and H. L. Morarji	129	Do campus rings signal a turn around for CAL?
Mike Bennett and David Smith	133	Evaluating television-linked computer software
M. D. Leiblum	141	A model for describing CAL authoring systems applied to TAIGA
David Smith and Ros Keep	151	Eternal triangulation: case studies in the evaluation of educational software by classroom-based teacher groups
Riccardo Degl'Innocenti and Maria Ferraris	157	Database as a tool for promoting research activities in the classroom: an example in teaching humanities
Helen J. Schwartz	163	Computer software for critical thinking
Allan Martin	169	An adaptable microworld for the history classroom
Margaret Cox, Valerie Rhodes and Jennifer Hall	173	The use of computer assisted learning in primary schools: some factors affecting the uptake
Marlene M. Laubli and Terry Hinton	179	Implementation problems of computer based training within the U.K. Government's Youth Training Scheme

John L. Chatterton	185	Knowledge control: the effect of CAL in the classroom
Vittorio Midoro, Augusto Chiocciariello, Donatella Persico, Luigi Sarti and Mauro Tavella	191	Ariadne's Thread: an introduction to logic programming
Eileen Scanlon and Randall B. Smith	199	A rational reconstruction of a bubble chamber simulation using the Alternate Reality Kit
David Benzie	209	The implications of window type environments for developers of educational software
Nick Hammond and Lesley Allinson	215	Development and evaluation of a CAL system for non-formal domains: the Hitch-Hiker's Guide to cognition
J. Terence Mayes, Michael R. Kibby and Hugh Watson	221	<i>StrathTutor</i> ©: the development and evaluation of a learning-by-browsing system on the Macintosh
Wilfred J. Hansen	231	The Andrew environment for development of educational computing
D. Cabrol, J. P. Rabine and T. P. Forrest	241	An educational problem solving partner in Prolog for learning infrared spectroscopic analysis
George R. S. Weir	247	Learning from a plan-based interface
Diana Burkhardt, Paule Chicken, Bob Hendley, Peter Jarratt, Nick Jurascheck, Mike Stoner, Gillian Weston and Jim Yandle	253	The exploration of fourth generation language program generation to assist in the production of multimedia computer aided learning
Sophie McCormick and Peter Bratt	257	Some issues related to the design and development of an interactive video disc

No. 2

Softstrip	i	Softstrip® data strip containing the contents list of this issue of <i>Computers & Education</i>
David Harrison and John M. Pitre	261	Computers in a teaching laboratory: just another piece of apparatus
E. C. Anderssen and S. H. von Solms	269	A CAI space-time model of historical battles
Mordechai Shacham and Michael B. Cutlip	277	Authoring systems for laboratory experiment simulators

Jeffrey Gorrell, Anthony Cuevas and Hunter Downing	283	Computer simulations of classroom behavior problems
Shlomo Breuer and Gideon Zwas	289	Polynomial iterations for root extraction
D. M. E. Crocker and J. D. Turner	301	A microcomputer training system for electric wheelchair users
Mahmoud Habib	311	A reading system for the blind based on geometrical shapes
John D'Arcy and John Gardner	321	Learning from teachers: teachers' perspectives of relevant courseware and training provision
Dennis R. Moreau and Wayne D. Dominick	327	A microcomputer-based interactive presentation development system
Janice E. J. Woodrow	339	Macros for educational research
Harold B. Teer Jr, Faye Teer and Reed McKnight	355	Peer taught microcomputer skills: an untapped resource for stretching the budget
Book Review	359	
Software Review	361	
Books Received	363	
Software Survey Section	I	

No. 3

Softstrip	i	Softstrip® data strip containing the contents list of this issue of <i>Computers & Education</i>
Jocelyn Wishart and David Canter	365	Variations in user involvement with educational software
D. Woodhouse and A. J. Jones	381	Integrating CAL with other instructional activities in schools
M. J. Lowrey	391	Microcomputer simulation of structural vibrations
J. M. K. MacAlpine	401	Computers in the teaching laboratory: experience with electrical engineering programmes
B. S. Hoyle	407	PC networks: usage and graphics tutorials
T. L. Yu	415	An undergraduate hardware project: controlling a smart robot by breadboard circuitry

I. P. F. De Diana and H. J. Vos	427	A lattice representational definition of a hierarchy of instructional processors usable in educational courseware
John Rae	435	Understanding management activity: a computer based approach
Jacky Griffin	443	Computer studies for the General Certificate of Secondary Education: teaching through applications
Book Reviews	453	
Software Survey Section	I	

No. 4

Softstrip	i	Softstrip® data strip containing the contents list of this issue of <i>Computers & Education</i>
Samuel Mudd and Kimberly McGrath	457	Correlates of the adoption of curriculum-integrated computing in higher education
Jay Liebowitz	465	A microcomputer-based expert system prototype for helping the layperson find specific information on breast cancer questions
Pierre-N. Robillard and Daniel Leblanc	471	The simulated working environment in a project-based software engineering course
C. J. Murphy	479	High level pseudo code techniques for the training of undergraduate electronic engineers in assembly language programming for embedded systems
Derek Whyman	493	An introductory experiment in automatic process control using a microcomputer as controller
Dennis O. Harper and Peter Y. H. Koh	501	Factors affecting secondary preservice teachers' computer knowledge
Klara Vancso-Polacsek and Andreas Fischlin	507	Automated construction of interactive learning programs in Modula-2
Howard G. Allen	513	Control in the teaching of structural engineering design
George M. White and Simon K. S. Wong	521	Interactive timetabling in universities
Judith S. Kline and Emily S. Wiggins	531	Development of the Wedding Planner—Extension's way to reach a young audience
John C. Turner	535	The use of spreadsheets in teaching undergraduate mathematics

**R. Wayne Headrick
and George C. Fowler**

539 Structured programming techniques: a study of
relative complexity

Jawaid Abdul Ghani

545 Diffusion of microcomputers in an academic
community

Book Review

553

Software Survey Section

I

